The Informational Content of Credit Ratings in Brazil: An Event Study

(Conteúdo Informacional de Ratings de Crédito no Brasil: Um Estudo de Evento)

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Abstract

This study analyzes the effect of credit rating announcements on stock returns in the Brazilian market during 1997-2011. We conducted an event study using a sample of 242 observations of listed companies, 179 from Standard and Poor's and 63 from Moody's, to analyze stock market reaction. Abnormal returns have been computed using the Market Model and CAPM for three windows: three days (-1, +1), 11 days (-5, +5) and 21 days (-10, +10). We find statistically significant abnormal returns in days -1 and 0 for all the three types of rating announcement tested: initial rating, downgrades and upgrades. For downgrades, consistently with prior studies, our results also showed negative abnormal returns for practically all windows tested. Overall, our findings evidence that rating announcements do have information content, as it impacts stock returns causing abnormal returns, especially when they bring 'bad news' to the market.

Keywords: credit rating; Brazilian market; event study.

JEL codes: G32.

Resumo

Este estudo analisa o efeito de anúncios de rating de crédito nos retornos de ações no mercado brasileiro no período de 1977 a 2011. Foi conduzido um estudo de evento utilizando uma amostra de 242 observações de companhias abertas, sendo 179 da Standard and Poor's e 63 da Moody's, para analisar a reação do mercado

Submitted 27 June 2013. Reformulated 29 November 2013. Accepted 5 February 2014. Published on-line 17 March 2014. The article was double blind refereed and evaluated by the editor. Supervising editor: Ricardo P. C. Leal. The authors would like to thank CAPES, CNPq and IAAER/Deloitte for the financial support.

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Rev. Bras. Finanças (Online), Rio de Janeiro, Vol. 11, No. 4, December 2013, pp. 503-526
ISSN 1679-0731, ISSN online 1984-5146

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acionário. Os retornos anormais foram calculados utilizando o Market Model e o CAPM para três janelas de evento: três dias (-1, +1), 11 dias (-5, +5) e 21 dias (-10, +10). Foram encontrados retornos anormais estatisticamente significativos nos dias -1 e 0 e para todos os três tipos de anúncios testados: ratings iniciais, downgrades e upgrades. No caso dos downgrades, consistente com os estudos anteriores, os resultados também mostraram retornos anormais negativos para praticamente todas as janelas testadas. De modo geral, os resultados evidenciaram que os anúncios de rating possuem conteúdo informacional, uma vez que impactam nos retornos das ações, especialmente quando eles trazem 'más notícias' ao mercado.

Palavras-chave: *rating* de crédito; mercado brasileiro; estudo de evento.

1. Introduction

One strand of credit rating studies examine whether ratings announcements affect stock and bond prices of public companies (Poon & Chan, 2008). On an efficient market, rating changes will only have an effect if they contain new information. Using regression models and/or event studies, these studies examine the instantaneous effect of rating changes in the prices of securities.

According to Li *et al.* (2003), studies on the informational content of ratings seek to answer two main questions: Do rating announcements have impact on the stock market? And if so, how does the market reacts to different types of credit rating announcements? For Barron, Clare and Thomas (1997), the motivation of these studies has been to evaluate the relevance of credit ratings to capital market efficiency.

In this line of thinking, our study aims to analyze the impact of credit rating announcements in the stock prices of public companies in the Brazilian market. The motivation for conducting this study is based on inconclusive findings in the existing literature, due to mixed prior results, as well as the uniqueness presented by the Brazilian market, as most studies do not address emerging economies.

Prior literature evidences a lack of consensus regarding the information content of credit rating. For Li *et al.* (2003) the informational value of rating agencies is a controversial and inconclusive issue. Previous research on the informational content of announcements issued has shown different results (Pinches & Singleton, 1978, Jorion *et al.*, 2005, Creighton *et al.*, 2007).

According to Calderoni *et al.* (2009) some studies in the 80s and 90s conducted in the United States presented evidence that only downgrades

have reliable information content. In other words, there seems to be an asymmetric effect, where negative news (downgrades) affect stock prices, but good news (upgrades) don't.

For Vassalou & Xing (2003), these results are considered confusing, because there would be no reason for stock returns to react to downgrades and upgrades asymmetrically. According to Jorion *et al.* (2005), it is unclear why only the negative information has value.

On the other hand, the empirical evidence on downgrade is also imprecise. Griffin & Sanvicente (1982), for example, found that poor stock performance after credit rating downgrades emerges constantly in the four weeks after the announcement. Holthausen & Leftwich (1986) also observed a decrease in stock price, but entirely focused on the announcement day and the day after the announcement.

For Creighton *et al.* (2007), despite the fact that studies reveal that security prices react to rating announcements, the magnitude of the response is usually very small, and the vast majority of adjustments in prices around announcements ratings occurs in the weeks or months prior to the announcement. According to Richards & Deddouche (2003), many studies have found statistically significant abnormal returns in the announcement periods, which are often small, especially in comparison to the abnormal returns for periods of pre-announcement. As stated, existing literature on the subject is quite controversial.

The justification for conducting our research also relies on the fact that the great majority of the previous studies have been developed in the U.S., UK and Australia; so the effect on other countries, especially in emerging markets, is still unclear (Li *et al.*, 2003). According to Creighton *et al.* (2007) most previous studies have used data from the United States, where there is a more significant role for credit ratings.

Furthermore, Han *et al.* (2009) argue that credit ratings, particularly those issued by Standard & Poor's and Moody's, are critical to international investors in corporate debt from emerging markets because:

- I. financial information in emerging markets are much less transparent than in developed markets;
- II. there are no reliable financial organizations in emerging markets that can certify the eligibility of a debt to international investors;
- III. many foreign institutional investors are not allowed to invest in speculative-grade bonds in emerging markets; and

IV. bank regulators use ratings for financial regulation and supervision as well as capital adequacy rules. We found a single study that used only Brazilian companies in the existing literature: Callado *et al.* (2008) analyzed the relationship between the stock returns of banks listed on the BM&FBovespa and the public announcement of the first risk assessment issued by credit rating agencies, i.e., the initial rating. They found no significant evidence supporting the hypothesis that the initial credit rating caused abnormal returns in the analyzed sample.

However, the study's sample was composed of only seven companies. Also, authors only used descriptive statistics, like means of abnormal returns to analyze their results. In this sense, our paper expands Callado *et al.* (2008) study as we have used a larger sample, abnormal returns calculated by both Market Model and CAPM and more robust statistical methods as we conduct an event study and multivariate analysis. We have also tested all three types of rating announcement (initial rating, upgrades and downgrades) and three windows (-1, +1; -5, +5; -10, +10).

For the reasons outlined, we believe there is a gap in existing literature, especially regarding the Brazilian market, which has specific characteristics that can lead to different results than those founded in other markets. Note, for example, that Brazil adopts a Code Law legal system, mainly derived from Portugal. According to prior research regarding "Law and Finance" (La Porta *et al.*, 1997, 1999, 2000, 2002), code law countries have: (i) less developed equity markets; (ii) firms with more concentrated control; (iii) lower number of publicly traded companies and smaller number of initial public offering each year; (iv) more companies penalized by investors in the valuation process; and (v) companies that pay less dividends.

For Lopes & Walker (2012), the Brazilian market is characterized by low enforcement, incentives for manipulation of financial statements due to tax influence, instable capital market and poor governance standards. In this sense, the role of credit rating is not quite clear.

Moreover, Brazil has been gaining economy importance in the global economy, due to high economic growth rates presented in recent years, inflation under control and stability of financial institutions. In 2012, Brazil became the 7th largest economy. In short, the Brazilian market presents a unique setting for conducting studies on credit rating.

2. Literature Review

Investors are often interested in measuring the risk of a company or a country to decide resource allocation (Sih, 2006). According to Callado *et al.* (2008) since the 80s, the demand for information related to credit risk has increased dramatically in the international financial market, and from that demand, several methodologies have been developed.

Credit rating expresses the rating agency's opinion regarding the ability and willingness of an obligor to meet its financial obligations on time (Standard & Poor's, 2011). For Gray *et al.* (2006), it is an assessment of the company's ability to make payments on time. According to Kim & Gu (2004) the rating of a debt security is an indicator of the default risk of a company. Studies conducted by agencies have demonstrated that there is a clear correlation between credit ratings and the probability of a subsequent default.

The literature suggests that credit ratings serve two purposes: they certify the financial condition of a company (initial credit rating) and signal a change in the prevailing financial condition (rating changes, i.e., upgrades and downgrades). For Li *et al.* (2003) rating agencies do provide valuable information to investors, but the usefulness provided has decreased in recent years due to the economic globalization and rapid technological development.

Credit ratings are defined by symbols, and the same symbols are used for both corporate and securities ratings. The settings are similar to each symbol expressing the default risk, i.e., the probability of non-payment of principal and interest on the debt (Camargo, 2009). Table 1 illustrates rating categories used by the three main agencies: Standard and Poor's, Fitch and Moody's.

Table 1

Rating categories used by S&P, Fitch and Moody's

	S&P and Fitch/Moody's	Description
Investment Grade	AAA/Aaa	Extremely strong capacity to meet financial commitments. Highest rating.
	AA/Aa	Very strong capacity to meet financial commitments.
	A/A	Strong capacity to meet financial commitments, but somewhat susceptible to adverse economic conditions and changes in circumstances.
	BBB/Baa	Adequate capacity to meet financial commitments, but more subject to adverse economic conditions.
	BB/Ba	Less vulnerable in the near-term but faces major ongoing uncertainties to adverse business, financial and economic conditions.
	B/B	More vulnerable to adverse business, financial and economic conditions but currently has the capacity to meet financial commitments.
Speculative	CCC/Caa	Currently vulnerable and dependent on favorable business, financial and economic conditions to meet financial commitments.
Grade	CC/Ca	Currently highly vulnerable.
	C/C	A bankruptcy petition has been filed or similar action taken, but payments of financial commitments are continued.
	D/-	Payments default on financial commitments.

Source: Adapted from Standard and Poor's (2011), Fitch (2011) and Moody's (2011).

Standard and Poor's and Fitch emphasize that ratings from AA to CCC may be modified by the addition of positive (+) and minus (-) signs to show the relative position within categories. Moody's (2011) notes that ratings can also be changed from the addition of the numbers 1, 2 and 3 for each category from Aa through Caa, in order to show the relative position of each rate within the category.

It is worth mentioning that once the rating is issued, it is subject to review and may be revised in response to changes in economic and financial conditions of the company or security. Thus, agencies continually reevaluate companies that are rated as a normal part of their reviewing process. Their aim is to evaluate if financial conditions surrounding the company have improved (deteriorated) sufficiently to demonstrate an increase (decrease) in the rating.

Ratings issued by the agencies may also be reviewed because of a specific event such as the announcement of a new debt financing, new equity issues, mergers, or a significant internal reorganization (Pinches & Singleton, 1978). In certain cases, the importance of such event may lead to an immediate revision of the company's rating. This usually occurs when the event in question has a strong influence on the financial and operating conditions of the company.

According to Choy *et al.* (2006) any information that signals a potential change in the company's future prospects will attract the attention of agencies and may also initiate a reaction in the market. In this sense, depending on the flow of relevant information to the agencies, ratings can be improved, lowered or maintained.

Over time, upgrades and downgrades may happen to the same debt instrument as the company's equity changes (Bi & Levy, 1993). However, according to Löffler (2005) credit ratings appears to be relatively stable compared to other rating systems, with subsequent changes in the same direction being more frequent than subsequent changes in opposite directions.

Agencies may also, prior to the actual change, place the company into a "watch list". If a company is placed in such a list, a comprehensive analysis is conducted, including meetings with managers (if necessary), before a decision is made to change or not its credit rating. In this context, a company put under observation indicates a situation in which, due to impending events, the probability of rating change is relatively high (Löffler, 2005). Finally, it is worthwhile also mentioning that the initial rating and

their subsequent revisions may differ according to the agency that assigns them.

3. Methods

The description of the methodological aspects of this study is divided into three parts. First, information about data collection and study's sample is presented. Following the research hypotheses are described, with their theoretical justifications. Third, we discuss the statistical analysis used.

3.1 Data and Sample

We have used credit ratings issued by two agencies, Standard and Poor's and Moody's, during the period of 1997-2011, which were obtained from S&P Capital IQ. Daily stock prices and financial variables for the companies of our sample were obtained in the database Economática®.

In order to avoid possible sample contamination, we have excluded from our sample observations regarding companies that had the following specific event during the event window: publications of financial statements, payment of dividends, mergers and acquisitions, changes in control, additions to CreditWatch List, rating announcement by another agency and issuance of debt and/or shares. These events could lead to abnormal returns and therefore would contaminate the expected effect of rating announcements. In this sense, we have searched for such events in the business press, specifically in the *Valor Econômico* newspaper. We have analyzed relevant facts filed by companies in the Brazilian Exchange Commission (Comissão de Valores Mobiliários).

Thus, observations were considered non-contaminated, for the purposes of this study, if there were no relevant company news within three days of the event (-1, +1), as adopted by Goh & Ederington (1999) and Jorion & Zhang (2007).

Table 2 shows the number of observations in each database, the exclusions made and this study's final sample.

Table 2
Study's sample

Sample selection	S&P	Moody's	Total
Total observations in the database	481	147	628
(-) Private companies observations	215	63	278
(-) State bonds observations	20	10	30
(-) Observations without stock daily quotes	79	27	106
(-) "Contaminated" observations	20	9	29
(+) Duplicated observations (common and preferred shares)	32	25	57
(=) Total observations analyzed	179	63	242

We have excluded a total of 278 observations from private companies and 30 ratings issued to state bonds. Furthermore, 106 observations were eliminated because companies shares were not traded in all the dates required for the analysis, as well as 29 observations considered "contaminated". Finally, we have added 57 observations as there are companies that issue both common and preferred shares who had daily prices. Thus, our final sample is composed of 242 observations: 179 from the database of Standard and Poor's and 63 from Moody's.

3.2 Research Hypotheses

We have analyzed the impact of three different types of rating announcements: initial rating, the first awarded to a particular company; downgrade, which reflects a rating decrease; and upgrade, which reflects an improvement in the company's credit rating. Thus, hypotheses were formulated for these three types of announcements.

Initial rating

H1 (Null): The announcement of an initial rating does not cause abnormal returns
H1.A (Alternative): The announcement of an initial rating causes abnormal returns

Assuming a semi-strong Efficient Market Hypotheses (EMH) and that rating agencies do have access to private information, one can assume that the announcement of company's first rating may lead to abnormal returns.

According to Jorion & Zhang (2007) if credit ratings are informative, one should expect a significant reaction in the stock price, regardless of improvements or downgrades. Nayar & Rozeff (1994) argue that if changes lead to credit rating information to investors and affect the stock price, then initial ratings should also express the initial news. In particular, the Informational Asymmetry Theory and Signaling Hypothesis claim that the

rating agencies are met with considerable private information about a particular company and so ratings may provide additional information.

However, Barron *et al.* (1997) highlight that there is no obvious direction for such excessive returns, which should occur to the extent that agencies are able to reduce the lack of information regarding the financial position of a company as well as decrease the uncertainty about future corporate performance.

Downgrade

H2 (Null): The announcement of a downgrade does not cause negative abnormal returns
H2.A (Alternative): The announcement of a downgrade causes negative abnormal returns

From an investor perspective, a downgrade signals an increase in the probability of default. Investors respond requiring an additional return. Consequently, the price of a security will fall (Chan, 2009). The rationale is that potential lenders and other parties related to the business use corporate ratings to determine the risk premium they should charge the company. Thus, under this hypothesis, a potential downgrade leads to an increase in the expected cost of borrowing for the company. The share price falls to reflect the decrease in expected future cash flows (Kim & Nabar, 2003).

Chan (2009) also highlights that several portfolio managers use credit rating as one of its portfolio selection strategies. In this sense, a credit rating downgrade would have a negative effect on stock prices as fund managers would sell securities that have been downgraded or have fallen to speculative grade.

As highlighted in Appendix 1, several studies conducted in other settings have found evidence supporting this hypothesis, like for instance: Griffin & Sanvicente (1982), Hand *et al.* (1992), Goh & Ederington (1993), Nayar & Rozeff (1994), Followill & Martell (1997), Kliger & Sarig (2000).

Upgrades

H3 (Null): The announcement of an upgrade does not cause positive abnormal returns
H3.A (Alternative): The announcement of an upgrade causes positive abnormal returns

Li *et al.* (2003) point out that an upgrade announcement should be associated with positive returns as an increase in credit rating may be perceived as a consequence of improvements in the economic and financial condition of companies.

According to the private information hypothesis, market should react positively to upgrade announcements (Taib *et al.*, 2009). This hypothesis states that the rating agency has access to private information about future cash flows of the companies, and they use credit ratings to express your information to market participants. Thus, the rating agencies make use of any upgrades to signal positive change in the prospects of firms. Market participants, in turn, react to the signal, driving up stock prices and hence valuing firms (Kim & Nabar, 2003).

Some studies presented in Appendix 1 have found positive abnormal returns for upgrades, corroborating the hypothesis of our study, like for instance: Kliger & Sarig (2000), Jorion *et al.* (2005), Creighton *et al.* (2007), Jorion & Zhang (2007).

3.3 Statistical analysis and models of abnormal return

Assessing the impact of rating requires a measure of abnormal returns, which is defined as: the current return in the event window event minus the normal (expected) return for window. According to Liu *et al.* (1999) that involves the comparison between actual returns of securities with returns estimated using models.

The first step to calculate the abnormal returns involves the computation of nominal returns. Soares *et al.* (2002) detail two different ways to calculate nominal returns: the Traditional, which presupposes a system of capitalization discrete, and the Logarithmic, which presumes a system of continuous compounding. However, these authors emphasize that the Logarithmic method is the most appropriate one, as it presents a distribution of returns closer to the normal distribution, which is one of the assumptions of parametric statistical tests. Equation 1 shows the Logarithmic calculation of the nominal return.

$$R_{it} = \ln \frac{P_t}{P_{t-1}} \quad (1)$$

where R_{it} is the nominal return of stock i on day t , adjusted for dividends; P_t is the closed price of stock i on day t , adjusted for dividends; P_{t-1} is the closed price of stock i on day $t - 1$, adjusted for dividends.

According to MacKinlay (1997) there are basically two types of models for calculating abnormal return of a stock: statistical and economic models. The author emphasizes, among the statistic models, the mean-adjusted model, the market-adjusted model and the standard market model. Among

the economic models, the most used ones are the Capital Asset Pricing Model (CAPM) and the Arbitrage Pricing Theory (APT).

In this study, we have used to different models to calculate the abnormal returns: (i) a statistical model, the standard market model and (ii) an economic one, the CAPM.

Equation 2 presents the standard market model (hereafter Market Model), which is the model used by most studies presented in Appendix 1.

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it} \quad (2)$$

where R_{it} is the return of stock i at time t ; R_{mt} is the return on the market portfolio at time t . The market portfolio used in this study was the Ibovespa index; α_i and β_i are Ordinary Least Squares (OLS) parameters, estimated considering a 120 day window, as suggest by MacKinlay (1997).

As mentioned, we have also used the CAPM to calculate the abnormal return, which is presented in Equation 3.

$$R_{it} = R_{ft} + \beta_i(R_{mt} - R_{ft}) + \epsilon_{it} \quad (3)$$

where R_{it} is the return of stock i at time t ; R_{ft} is the risk-free rate at time t ; we have use Certificado de Depósito Interbancário (CDI) as the Brazilian risk free rate, as suggested by Soares *et al.* (2002) and Alberton (2003). R_{mt} is the return on the market portfolio at time t . The market portfolio used in this study is the Ibovespa index.

We define the Cumulative Abnormal Return (CAR) as the aggregation through time for an individual event from t_1 to t_2 :

$$CAR_i(t_1, t_2) = \sum_{t_1}^{t_2} AR_{it}$$

The daily Average Abnormal Return (AAR_t) for any n events (either positive or negative announcements) is then calculated by summing (in event-time) across the n events. The Cumulative Average Abnormal Return ($CAAR(t_1, t_2)$) between any two days t_1 and t_2 within the event window is defined as the sum of the average abnormal returns over that period.

We have used the T-test to verify if abnormal returns calculated from the models were statistically different from zero. According Campbell *et al.* (1997) we should use this type of test to investigate if a given event has any significant impact on the returns in the analyzed window. The T-test has also been used in previous studies like Goh & Ederington (1993), Matolcsy

& Lianto (1995), Liu *et al.* (1999), Abad-Romero & Robles-Fernandez (2006), Li *et al.* (2006), Purda (2007), Calderoni *et al.* (2009), Chan (2009), Han *et al.* (2009).

Our study tests different windows, which has also been done in previous studies (Choy *et al.*, 2006, Abad-Romero & Robles-Fernandez, 2006, Han *et al.*, 2009). Thus, we analyze the impact of rating announcements in the following windows: three-days (-1, +1), 11 days (-5, +5), and 21 days (-10, +10); day zero is the day on which the credit rating is issued by the agency.

Figure 1 details the estimation window and the event windows adopted in this study.

Figure 1
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Besides the T-test, we have also conducted a cross section analysis, using a multiple regression as showed in Equation 4.

$$CAR = \beta_0 + \beta_1 SIZE + \beta_2 LEVER + \beta_3 RCHANGE + \epsilon \quad (4)$$

where:

CAR is the Cumulative Abnormal Return obtained using two different models, market model and CAPM, for three different windows (-10, +10; -5, +5; -1, +1);

SIZE is the natural log of Total Assets;

LEVER is (Current liabilities + Long-term liabilities)/Total assets;

RCHANGE is the number of grades that the rating is reduced (old less new), where ratings are measured from 1 (AAA) to 22 (D/SD) for S&P and 1 (Aaa) to 21 (C) for Moody's.

4. Results

Initially, we've carried out a descriptive analysis of initial ratings, downgrades and upgrades. Table 3 shows the total amount of each type of rating announcement per year.

Table 3
Amount of ratings per year

Year	Standard & Poor's			Moody's			Total
	Initial Rating	Downgrades	Upgrades	Initial Rating	Downgrades	Upgrades	
1997	2	0	0	0	0	0	2
1998	3	0	0	0	0	0	3
1999	0	6	0	0	0	0	6
2000	1	0	0	1	0	0	2
2001	5	0	7	6	0	0	18
2002	1	22	3	7	4	0	37
2003	2	5	3	0	4	0	14
2004	1	0	14	1	2	2	20
2005	5	0	7	3	0	4	19
2006	6	0	15	0	0	2	23
2007	4	0	16	3	0	0	23
2008	4	2	8	4	0	2	20
2009	4	6	7	0	4	0	21
2010	5	3	7	8	0	2	25
2011	1	0	4	4	0	0	9

The sample has a total of 242 observations: 81 initial ratings, 58 downgrades and 103 upgrades. Table 3 also evidences a greater amount of rating announcement in the 2000s, peaking in 2002, where high interest rates prevailed, culminating with 22 downgrades issued by Standard and Poor's and four by Moody's. However, many of these companies that suffered relegation in their rating in 2002 received upgrades in 2004. Likewise, the years 2006/2007 are highlighted by the number of companies with improved ratings.

Table 4

Transition matrix between downgrades and upgrades

Previous Rating	New Rating								Total
	A/A	BBB/Baa	BB/Ba	B/B	CCC/Caa	CC/Ca	C/C	D/SD	
A/A	2	0	0	0	0	0	0	0	2
BBB/Baa	6	15	7	0	0	0	0	0	28
BB/Ba	0	15	37	25	0	0	0	0	77
B/B	0	0	27	5	5	0	0	0	37
CCC/Caa	0	0	0	4	1	4	0	1	10
CC/Ca	0	0	0	0	0	0	0	4	4
C/C	0	0	0	0	0	0	0	0	0
D/SD	0	0	0	0	3	0	0	0	3
Total	8	30	71	34	9	4	0	5	161
Upgrades	6	27	58	8	4	0	0	0	103
(%)	-75%	-90%	-81,70%	-23,50%	-44,50%	0%	0%	0%	-62,70%
Downgrades	2	3	13	26	5	4	0	5	58
(%)	-25%	-10%	-18,30%	-76,50%	-55,50%	-100%	0%	-100%	-37,30%

Table 4 shows the transition matrix between downgrades and upgrades. Once no AAA/Aaa or AA/Aa was issued for the companies in our sample, columns and rows for these categories were omitted from the table. Considering, only the announcements of rating changes (i.e., excluding initial ratings), upgrades represent 64% of sample observations. Also, we have noted that most ratings are located around the line that divides investment grade and speculative grade.

Before conducting the T-test, we've carried out normality tests, more specifically the Kolmogorov-Smirnov and the Levene tests. According to the statistical results, it is not possible to reject the null hypotheses of normal distribution and homogeneous variance. Table 5 shows the results per day for each type of rating. We calculated the AAR and realized the T-test for each day, from -10 to +10. For both models, we found statistically significant abnormal returns for all three types of ratings in days -1 and 0.

Downgrades, as expected, generate a statistically significant abnormal return around the announcement day. For upgrades, we found positive abnormal returns in both models in the announcement day, at a 1% significance level. Overall, our findings are as expected: positive abnormal returns for upgrades and negative ones for downgrades concentrated around the day of the announcement. Regarding initial ratings, day -1 presented a negative abnormal return statistically significant at the 1% level while day 0 presented a positive one at the 10%.

Table 5

AAR and T-test per day of the window event

Panel A – AAR using the Market Model						
Day	Initial Rating		Downgrade		Upgrade	
	AAR	T-test	AAR	T-test	AAR	T-test
-10	0,00%	0,999	0,00%	0,375	0,00%	0,479
-9	0,00%	1,613	0,00%	-0,994	0,00%	0,24
-8	0,00%	0,554	0,00%	-0,56	0,00%	0,534
-7	0,00%	0,658	0,00%	-0,912	0,00%	-0,453
-6	0,01%	1,386	0,00%	0,215	0,00%	-0,38
-5	0,00%	-0,437	0,00%	-1,041	0,00%	0,402
-4	0,00%	-0,186	0,00%	0,31	0,00%	-0,91
-3	0,01%	2,348**	0,00%	0,569	0,00%	-0,112
-2	0,00%	-0,577	0,00%	-0,793	0,00%	0,152
-1	-0,01%	-3,258***	-0,01%	-1,594*	0,00%	-1,760**
0	0,02%	1,617*	-0,01%	-2,027**	0,01%	2,206***
1	-0,01%	-0,982	0,00%	-0,22	0,00%	-0,723
2	0,00%	-1,424	0,00%	0,932	0,00%	0,452
3	0,00%	1,453	0,00%	0,311	0,00%	-0,15
4	0,01%	1,146	0,00%	-0,078	0,00%	-1,385*
5	-0,01%	-1,172	0,00%	-0,689	0,00%	-0,333
6	0,01%	1,198	0,00%	-0,19	0,00%	1,643**
7	-0,01%	-1,409	0,00%	-0,067	0,00%	1,07
8	0,00%	-0,503	0,01%	1,25	0,00%	-0,303
9	0,00%	1,234	0,00%	0,819	0,00%	-1,779**
10	0,00%	-0,1	0,01%	2,840***	0,01%	1,113
Panel B – AAR using the CAPM						
Day	Initial Rating		Downgrade		Upgrade	
	AAR	T-test	AAR	T-test	AAR	T-test
-10	0,00%	0,979	0,00%	0,051	0,00%	0,655
-9	0,00%	1,554	-0,01%	-1,358*	0,00%	.,413
-8	0,00%	0,531	0,00%	-0,881	0,00%	0,651
-7	0,00%	0,611	0,00%	-1,339*	0,00%	-0,344
-6	0,01%	1,373	0,00%	-0,181	0,00%	-0,181
-5	0,00%	-0,45	-0,01%	-1,425*	0,00%	0,505
-4	0,00%	-0,227	0,00%	0,072	0,00%	-0,752
-3	0,01%	2,342**	0,00%	0,24	0,00%	0,011
-2	0,00%	-0,628	-0,01%	-1,025	0,00%	0,32
-1	-0,01%	-3,278***	-0,01%	-1,739**	0,00%	-1,602*
0	0,02%	1,611*	-0,02%	-2,181**	0,01%	2,301***
1	-0,01%	-0,989	0,00%	-0,504	0,00%	-0,611
2	0,00%	-1,462	0,00%	0,572	0,00%	0,573
3	0,00%	1,384	0,00%	-0,032	0,00%	-0,008
4	0,01%	1,136	0,00%	-0,392	0,00%	-1,22
5	-0,01%	-1,182	0,00%	-1,033	0,00%	-0,244
6	0,01%	1,187	0,00%	-0,493	0,00%	1,894**
7	-0,01%	-1,417	0,00%	-0,347	0,00%	1,278*
8	0,00%	-0,538	0,01%	1,043	0,00%	-0,084
9	0,00%	1,234	0,00%	0,531	0,00%	-1,559*
10	0,00%	-0,15	0,01%	2,590***	0,01%	1,153

Figure 2 evidence the path for abnormal return for each type of rating announcement. Axis 'x' presents the days in our window and axis 'y' the AAR calculated by the Market Model. We do opted not to present the graph with AAR calculated by CAPM, as results are very similar. As showed in Table 5, abnormal return calculated by the Market Model and CAPM are quite similar.

Figure 2
AAR for each type of rating announcement

As expected, the Average Abnormal Return (AAR) for downgrades announcements showed a downward trend, especially in days -1 and 0. Interesting, the AAR for initial rating showed lots of volatility during the window; also, in the day 0, it resulted in the highest AAR in the window.

Table 6 shows the Cumulative Average Abnormal Return (CAAR) analysis for each event window, in order to check whether the returns are different from zero, using the T-test.

Table 6

CAAR and T-test for each event window

Panel A – CAAR using the Market Model			
Period	Initial Rating	Downgrade	Upgrade
-10; +10	0,02%	-0,01%	0,01%
	1,870*	-0,251	0,6
-5; +5	0,00%	-0,03%	0,00%
	-0,097	-1,297*	-0,453
-1; +1	0,00%	-0,03%	0,00%
	-0,257	-1,654**	0,164
Panel B – CAAR using the CAPM			
Period	Initial Rating	Downgrade	Upgrade
-10; +10	0,02%	-0,04%	0,01%
	1,766*	-1,710**	1,306*
-5; +5	0,00%	-0,05%	0,00%
	-0,215	-2,086**	0,153
-1; +1	0,00%	-0,03%	0,00%
	-0,325	-2,505***	0,507

First row evidences de CAAR for the window period for each type of rating.

Second row shows the T-test value and its significance:

*** Significance at the 1% level

** Significance at the 5% level

* Significance at the 10% level

For downgrades, we found statistically significant negative abnormal returns in almost all windows tested. For instance, using CAPM, at a 5% significance level, we found negative abnormal returns for windows -10, +10 and -5, +5 and at 1% significance level for the window -1, +1.

Regarding initial ratings, the Cumulative Average Abnormal Return (CAAR) for the window -10, +10 was the only statistically significant. For upgrades, we could not find statically significant abnormal positive returns, except for one case.

Finally, we have conducted a multiple regression analysis for upgrades and downgrades. Out of 161 observations, we have exclude banks, due to their specific capital structure that impact the leverage ratio, which is one of the control variables. Also, to eliminate duplicity, for companies that had more than one type of stock, we only considered common stock. Thus, our final sample for the cross section analysis is composed of 96 observations.

We've tested six different models, as Cumulative Abnormal Return (CAR) has been computed by both Market Model (MM) and CAPM for three different event windows: 10, +10; -5, +5; -1, +1. Table 7 evidences the cross section analysis.

Table 7

Cross-sectional analysis

	MM	CAPM	MM	CAPM	MM	CAPM
SIZE	,007***	,353***	,284**	,315***	0,088	0,136
LEVER	,057***	,318***	,249**	,100**	0,06	0,037
RCHANGE	0,005	0,141	0,068	0,008	0,009	0,138
F-Statistic	4,976***	4,601***	2,419*	3,686*	0,181	1,269
R^2	0,14	0,13	0,073	0,107	0,006	0,04
Adjusted R^2	0,112	0,102	0,043	0,078	-0,027	0,008

Since the abnormal returns from both models, MM e CAPM, were very similar, so were the results as showed in Table 7. Overall, the window -1, +1 presented the best results, as both model (F-Statistic) and control variables (SIZE and LEVER) were statistically significant at a 1% level. On the other hand, the regression for -10,+10 was not significant at all. In this sense, our results evidences that regressions with shorter windows tend to be more relevant.

Surprisingly, the variable RCHANGE was not statistically significant in any model. Some previous studies (Barron *et al.*, 1997, Choy *et al.*, 2006, Li *et al.*, 2006) also had similar results. Overall, the amplitude of rating decrease (or increase) doesn't seem to be related to abnormal returns.

5. Conclusions

This study aimed to analyze the impact of credit rating in the stock prices of public companies listed in the Brazilian market. Our sample is composed of 242 observations of listed companies during the period of 1997-2011, 179 from Standard and Poor's and 63 from Moody's. Abnormal returns have been computed using the Market Model and CAPM for three windows: three days (-1, +1), 11 days (-5, +5) and 21 days (-10, +10). It is worthwhile mentioning that abnormal returns (both AAR and CAR) presented similar results in the two models used.

Our findings from the T-test analysis were as expected from our hypotheses, in line with previous studies: positive abnormal returns for upgrades and negative ones for downgrades concentrated around the day of the announcement. Regarding initial ratings our results are mixed.

In the Cumulative Average Abnormal Return (CAAR) analysis for each event window, we also found statistically significant negative abnormal returns in almost all windows tested for downgrades. Regarding upgrades and initial ratings our results are inconclusive.

The amplitude of rating change, RCHANGE, was not statistically significant in cross section analysis. Our analysis evidences that regressions with shorter windows tend to be more relevant.

Overall, our results show that rating announcements do have informational content to the Brazilian market for downgrades (just like most of prior studies in the existing literature presented on the Appendix 1), especially for shorter windows. In sum, our findings evidence that credit ratings are value relevant, especially when they bring bad news to the market.

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